

NOTE: Local members-annual dues are due in July-if you can't be there, you can mail a check to Sincus, PO BOX 36, Johnson City, NY 13790-and thanks for your support.

Demos, reviews, homebrewed, or commercial projects anything that you think might be interested in BRING it in! We are in much need of fresh ideas, new perspective, old ideas, unsolved problems-both for the newsletter and for the meets. If you are timid about talking before a group, write it down, tape it, but get it to the meeting.

June 18, 1986 SINCUS monthly meet at the Vestal Library started at 7:10pm with 11 attending.

In his last meeting as President, Gary Ennis brought out the Wall Street Journal of June 16, 1986 which had devoted its pullout section to COMPUTERS. Just behind Texas Instruments was SINCLAIR with 3/4 million home computers, sold and in homes in the US. If only half are actively used, that is a BIG market. After apologizing for his lack of attendance over the past several months, Gary thanked all for their patience. Then, he pulled out the 2nd Annual Carl Terry Memorial Award for the member who had contributed the most over the past year. Dave Schoenvetter-noden vizard emeritus was given a wall plaque and a year's paid dues. In spite of a soaked 2068, Dave is going forward with noden software for the ole 1000!

John Sims, who becomes President in July talked of his ideas for the upcoming year. John who finally caught up with us a couple years ago ( we moved from meeting location to location like a floating crap game during our first couple years ), is a professional programmer with the local computer company, and his hobby or first love is computer languages. At the moment, "C" is his current undertaking. In an attempt to get to know all better, the membership each in turn talked of their own use of the computer and much was news to us all. It turns out with just a dozen present, there are 12 different uses and interests of the computer. From wanting to learn both hard and software, to the design of characters, such as Greek, Russian and Hebrew, to word processing and spread sheet, to learning BASIC, to advanced experimental languages, to learning the QL to making "C" meaningful, the members found that we did not know what others were doing for the past four years.

Stan Livingston brought his QL again, and this time introduced it to the members. Stan wrote a factorial program to determine the highest number the QL could handle. A calculator can factorial to 69, the QL to 300. Some of the features of the microdrive were shown. Thanks Stan.

ZI Computing was distributed to subscribers, the MAY and JUNE issues having arrived since the last meet. Apparently not many are satisfied with the new monthly version, as no one has signed up to renew their subscription.

Computer Shopper had an offer, for those wishing to subscribe for one year, the cost is \$15, and the user group gets to keep \$2. So for all those who did not make the meet, and wish to take Computer Shopper for a year, and help out the treasury, send a check made out to Paul Hill, PO Box 36, Johnson City, NY 13790 for \$15. I will mail all subscriptions to Computer Shopper on July 31, so get it in the mail today. Mail and make it out to me, as it delays matters to go thru the treasury and back to my account. Thanks

8-8 July 1-Tuesday Board meet Vestal Library, 6:30 8-8 Computer cassette tapes are in, still a \$1 a tape.

Sinclair Computer Users' Society  
SINCUS NEWS VOL 4: NO 5  
PO BOX 36, JOHNSON CITY, NY 13790

### Secretary's Report

May 21, 1986 SINCUS monthly meeting at the Vestal Public Library started at 7pm, with 13 members attending.

-Elections were the first order of business, the nominated slated ran unopposed, and a show of hands unanimously carried the day. The society's officers for 1986-1987 are:

President.....John Sims  
Vice President.....Gary Ennis  
Treasurer.....George Penney  
Secretary.....Paul Hill  
Trustee.....Dave Schoenvetter  
Trustee.....Don Lanen  
Trustee.....Wes Brzozowski

-A motion was made and passed for the society to purchase a bulk order of C20 recording tapes. When received these will sold at meets for \$1 each, proceeds to help the treasury.

-Due to transport problems, Gary and George were unable to attend this meet and the hardware meet on Sunday, May 18. The hardware meet drew 3 members, no report of anything happening.

-The first QL in the area was brought to the meeting by Stan Livingston. Pre-meeting demo by Stan indicated an apparent lack of interest in the new machine, so further effort was not spent on a demo during the meet.

-The group discussed software piracy, with no one advocating piracy, and the continuing series between Wes, me and ATSU was brought up.

-John, the new president of SINCUS as of July, talked of his ideas and sought input from others present as how best to continue the monthly meeting format.

-The problems with producing the newsletter were brought up, as we are looking again for a copying machine-at a low, low price. We have been spoiled by the generous people who had done this, but overhead costs are growing. It was suggested that the letter be done on the printer, that is possible, but will the society buy a new printer everytime one wears out? Whenever that maybe?

Thanks to Art Mortensen, NYC and Bill MacDougall, Montreal for their renewals and support.

Bi-monthly notices to go out to local members, as meeting reminders, for the newsletter only goes out every other month.

Corresponding members, check your mailing label for the date on the bottom line, if it is current date and says RENEWING ?, your subscription is about to lapse. Still \$8 a year!

News, New, Views and Reviews-----  
-----Paul Hill, SINCUS

-The Computerfest (May 3-4) has been reported in several newsletters as a success. And apparently a fest is in the works for October in the New York Area! Here's hoping we'll be able to attend that one. At the Cincinnati fest, over 350 attended, and some 35 vendors displayed their wares. The Milwaukee TS User Group has videos of the two day event, and can copy it for a tape and postage. If there is enough interest in going to the NYC meet, we could hire a bus...maybe the wives could go shopping! When we hear of details, we'll let all know.

-At Computer Response-the QL distributor in the US, brought the QL stock in the US just prior to the sale of Sinclair to Anstrad. All the QLs are still for sale in the US, and are not going back to England. There are now just 13 authorized dealers for the QL in the US. They plan to see that more 3rd party producers are represented in this country. If you know of or have any good ideas for the QL, inform your dealer about it. At was at the show, and gave away a QL system. Thanks to the PLOTTER and SMUG Bytes for the info.

-"Das computermachine is nicht fur gefingerpoken und mittengraben. Ist easy schnappen der springwerk, blovenfusen und poppencorken nit pittzensparken. Ist nicht fur geverken by das dummkopfen. Das rubbernecken sighteeren keepen hans in das pockets - relaxen und vatch das blinkenlights."-SMUG Bytes  
Sinclair Milwaukee Users Group, PO Box 101, Butler, WI 53007

-How to make the bucks with a computer, apparently some Wall Street whiz kids are using computers to keep track of their stocks, on a very frequent basis, their own tax situation, and when a particular stock is in a phase which indicates a profit, either current or future can be met, a buy or sell indication is given. These boys are playing with 5 mil to start with and the profits are BIG, so big that it maybe come regulated, but no one knows quite how to - YET. So what is to keep someone with a little less than 5 million and a little ole TS machine from making a few extra bucks??

-The IRS is going to regulate income tax software, by fining big bucks against software firms which have little pointers in their product which points out some of the less likely to be audited deductions and itemizations.

-Aerco has a version of C/PM available, called R/PM available for \$25 and enables a 80 column screen display.

The offer from SMUG Bytes of a copy of their video of the Cincinnati Computerfest for postage costs and a tape was voted on and past at the June meet. A blank tape and check were mailed off June 21. It will be shown at the library on their VCR. A rerun, or loan out of club's tape will be possible.

A QL program for professional engineers, there is a Customers Design, Engineering and Consultancy Services, for management and field engineering. Those who may have an interest in these are executives of construction or industrial investment companies or civil engineering companies in design work. For anyone interested in details of the ad, see me, Paul Hill or write:

Software Atelier

POB 140

00002 Karakoy, Istanbul Turkey

+++++ distributors inquiries invited +++++

Hello and welcome to Richard Hurd, Warrenton, OR, a new member and to William Tilley, Hal Sohn, and Scott Eddy for renewing their membership. A newsletter article from you all would be appreciated.

We still are selling CLONE, \$6 to members only. Non-members can purchase CLONE from RMG in Oregon City or from Triangle Sinclair Users Group, Carrboro, NC. CLONE can made that back up copy of any TS2068 program and most if not all Spectrum programs. The program CLONE can be transferred to microdrive with little effort. With CLONE's header reader data, transferring programs to disc is made easier.

Send a check for \$6 to SINCUS, PO Box 36, Johnson City, NY 13790 today, and if you dues are almost due, add another \$8 for another year of SINCUS NEWS. Thank you for your support.

A note on the use of CLONE, I've used CLONE on every program I own, with one problem, the TS2068 Machine Code Tutor program. The program has several loads per tape, one must enter an answer before the next section will load. CLONE will load all sections with no break between sections, and the CLONED program will not LOAD properly. Each individual section has to loaded into CLONE separately, and then taped before CLONEing the next section.

Thanks to all the members who helped with this issue:  
Wes for the really big article!  
Mark Fenderick for the full page ad!  
Barb Hill, who did all the copying, printing and folding!

I recently came across an old issue of SYNTAX, and not remembering that particular issue, began to read it: of interest was a letter to the editor, and the writer complained of poor service he had received from mail order firms doing business under the guise of software supply houses. The writer was Robert Dyl, Newport RI. In light of the difficulties four members are having getting orders filled or money back, please think twice about doing business with Mr. Dyl., PAN Editor

If that is your question, then I hope that some of the data that I've compiled will at least answer a couple of the basic questions about the different disc system available here in the states and Canada.

I cannot do much more than tell you what the manufacturers (three of four) sent me, and what a few users have written. The user comments are valuable because a couple have more than one system, and can compare the pluses and minuses of each, first hand. The decision for me will hinge largely on cost. I don't see any system (complete with power supply and 2 Drives, no covers, etc) for less than \$200. I did hear from a half a dozen users. Well, it is more than I had to go on before I started, but less than I'd hoped for.

I read many interesting comments in several other User Group's newsletters, and have included a list of newsletters that have material on this subject. In Listing, Bob Gilder is currently writing a multipart article on disc drives, the whole picture, and I suggest you read that for any in-depth understanding of the drives in general and specially written for 2068 users.

Write to the manufacturers for more detailed answers to your questions, you may get an answer, more likely an answer which opens up more questions.

For a start, a disc drive, needs an interfacing device called a controller, a power supply and drive. This is the hardware, more important is the DOS, the Disc Operating System. There is TOS, the Times Operating System (Zebra), and JLO DOS (Dilger), and Aerco's RPM and the Larkin DOS. While there are differences in hardware, it is the DOS which lays out the operation of the disc and how it handles files, programs and the differences of each, while significant, can not be deemed for this article. Comparative notes from users can give you a clue as to the performance of the DOS. If you need to fill in the blanks, get down to your local library and read on this, or get to a friend who has any kind of disc drive and LEARN first hand.

So what is the advantage of a disc? Speed! If your time is limited, and your use of the computer involves word-processing, spread-sheet work, newsletter production, the disc will save you time. This will come at some cost, average cost \$300. If you go into another system at a later date, the drives and power supply can go with you, as most likely your printer and monitor. Discs, of the 5.25" variety are fairly inexpensive, cheap as tapes and probably of higher quality. Speed is the key, the load rate is well over 10x as fast as tape. The loading speed is really the minor factor, the file handling is what makes it great! The DOS system in the system you get.

news, views con't

JRC Software, PO Box 448,  
Scottsburg, IN 47170 has a soft  
ware catalog and with \$2, get a  
tape of FREE software  
3D Moving Display  
3D Pyramid  
3D Tic Tac Toe game demo  
Diamond Mike game demo  
John Coffey commentary on 32 bit  
computers—order it today!

Syncware News, 1 year—6 issues  
for \$16.95 order now, use visa  
or master charges  
Syncware  
PO Box 64  
Jefferson, NH 03583  
Still best bargain around!

"May you live forever, and may  
the last voice you hear be  
mine"

We got a recent (April 86) news  
letter from the Cincinnati UG  
and all you modem users, here's  
reviews on Casby's Loader V, and  
TSXMODEM, and explanations of  
protocol, and words to  
understand all by Lucy and Randy  
Gordon. It will be avail- able  
at next meet.

SINCUS NEWS is read in Mexico,  
Korea, West Germany, Canada, and  
18 states. Renew now, we are  
looking at increases in postal  
rates next year and for ever  
rising printing costs. Our swaps  
have increased to 27 groups and  
there's more out there. Once a  
modem gets hooked up around  
here, the newsletter will be  
posted on a local bulletin  
board. We need help with  
articles—for someone to write  
one! Write a review, or an  
opinion, see your name in  
print!

With this chart I am comparing apples to pears, whole systems to just  
interfaces. All data is approximate, dated, and gathered from several sources.  
The whole picture changes the minute one of the outfits below releases something  
new. Send for the dealer's ad. Talk to owners, read reviews and then if you  
feel disc is for you, then join me as I'm about to get a ah...

FEATURE	Aerco	Dilger	Larken	Zebra
PRODUCT	system	IF only	IF only	system
solid	or parts			or parts
COST	\$380	\$196	\$95	\$375
IDrive	many	IF only	IF only	several
system	add-ons	available		options
DOS	available			available
DRIVES	R/PM or a BK ROM	JLO	LDS	TOS or C/PM
SIZE	3" to 8"	3" to 5.25"	5.25"	3"
TYPE	Shugart	Shugart	Shugart 455	
DENSITY	changeable	changeable	SD	DD
SIDES	changeable	DS	DS	SS
# of DRIVES	4	4	2	4
FORMATTED	395K	400K	160K	320K
MEMORY				
EXTRAS	64k RAM included	RGB output expansion slots	2068 Buss	2-RS232 ports
Uses 2068	NO	NO	Yes—4K	NO
RAM				
Guarantee	1 yr warranty	30 day	60 day	No data
Uses KEYWORDS	YES	YES	NO	YES



**Aerco**  
Box 18093  
Austin, TX 78760  
(512)451-5874

Data from Jerry Chamkis

\$199 for RD-68 Disc board, 64K on board RAM, w/256 K Ram add \$50 or \$80 depends on options—can control up to 4 drives of any size), includes system diskette, BK add serial or parallel IF at: \$69 for parallel, \$99 for 2 RS232s

\$99 dual drive cabinet, power pack  
\$79 drives—DSDD 400K 2/3 height  
add \$3 per item for shipping  
approx \$380 for 1 disc drive  
Supports ANY Shugart compatible drive, SS, DS, SD, DD, QD  
Capacity depends on drive, ones sold have a formatted capacity of 399K bytes, which can be any combo of program and data.

NEH-RP/M, an enhancement of CP/M 2.2— a CP/M diskette is in the drive, the system boots as a CP/M, if a 2068 disc is in the drive, it boots as such...coming...a Spectrum disk which will load spectrum system into DOCK Bank RAM where it runs as an LRDS and Spectrum programs are saved and loaded from disk.

**RP/M FROM AERCO**

"RP/M is a fully compatible enhancement of CP/M (Control Program for Microcomputers) that will run all versions of 2.2 software as well as support 16 individual users. It makes us very happy to note that our implementation of this operating system is exceptionally fast and efficient."

Now you can run thousands of specialized CP/M version 2.2 software titles. Whether you want to use your TS2068 for serious business, industrial or developmental applications, this is the system for you. The software is supported by the FD-68 disc system with extra memory in the dock bank (normally 64K, expandable to 256K). Up to four disc drives can be used with capacities up to 800K each. For CP/M programs that are not available on 5 inch drives, we can support 8 inch drives as well. We can also transfer your programs between different size discs for you.

**TS 2068 DISC SYSTEMS**

The 8K ROM contains the operating system. When the system is booted, the DOS is loaded into the 64K of extra memory in the DOCK bank, thus preserving the entire usable memory in the computer's HOME memory. The ROM can also be custom programmed to accommodate any combination of disc drive parameters. You can mix or match 3.5" with 5.25" single side with double side and 40 track with 80 track.

The 64K of on-board RAM can be used as a second bank of system memory or for a full-blown RP/M system. It provides 8 x 8K chunks located in the DOCK bank and accessible via the TINEY's bank switching capability. If you need more memory, the 64K can be upgraded to 256K. The upgrade requires some rework of the board and can be performed when purchased or at a later time. There are two versions of the 256K. The first limits the system to a maximum of 2-drives by using the address of drives C&D to decode the extra memory as 3 extra pages of 64K each. If more than 2-drives are required, additional modification is required to the board. We can even provide instructions (and parts) if you prefer to upgrade the system yourself.

**The John Diger Co.**  
11601 Whidbey Dr.  
Cumberland, IN 46229

Data from John Diger

Need to buy?

1. 2068 expansion board(assembly and tested=\$54.95)
  2. Disc board "A"(assembly and tested=\$66.95)
  3. Board "B" assembly and tested=\$53.95
- Both "A" and "B" assembly and tested = \$119.95 with NMI option \$129.95 (this is just the minimum facts, write to John for details, extras, bare board prices, etc)  
You'll need to get the drives and power supply—shugart 34 pin standard connector.

**SPEED**—John provides some figures, transfer of its sequential files at a true rate of 32K bytes per second.

Board "A" is the disc controller, plugs into the expansion board. Cable is available as an option if needed.  
Board "B" is the firmware/bank logic/memory board. Includes the JLD SAFE Disc Basic VI.31. Advanced versions in the works.  
FAST simple, works with both 2068 and Spectrum modes and uses no HOME RAM.

The JLD system can support up to four drives, discs can be formatted for 40 (200K Bytes/side or 4 programs and menu) or 80 (400K bytes/side or 8 programs and menu) tracks per side. The discs can be of 3", 3.5" or 5.25", Single sided, or double sided, Double or Quad density. RBB circuitry is included on required expansion board. It uses MD 2068 RAM. Tasword 2 WILL LOAD IN ABOUT 4 SECONDS. A menu loads in 1 to 1.5 sec, and a file could then load, speed depends on head position(the drive's head).

(RGB—Red, Green, Blue the designation for high resolution screen display, with the RBB connected to a hi-res monitor you can enjoy color displays with out the wigglyes!)

The current DOS - SAFE VI.31 saves the entire RAM contents to disc. The user uses a supplied menu or writes his own, this goes in track 0, the remaining disc space holds the programs or data files. A NMI switch is available, enabling the user to load to disc any program in the RAM, copyable, or not. The JLD DOS is completely compatible with all ARDS cartridges, and can be used with Spectrum via Romsavitch, Spectri... ROM or emulator.

A 2068 64K memory board will be available in the future. It will be mapped out in a totally new bank of memory enabled in 8 chunks via a chosen port. The board will contain some bank select/chunk select circuitry and will be able to be used at the same time as board "B" via use of a Daisy chain output from board "B". It will be possible to use up to 16 of these boards at the same time, because the lower nibble of a particular board's horizontal select port can be user selected and set via position DIP switch.

How does the JLD system work? Well, from the user point of view, it is like this: LDAD a cassette program into the 2068, press the NMI switch, press a key to indicate which file to store it in, and it IS on disc. To LOAD later from disc, power up, press <LDAD><ENTER>(2 KEYPRESSES), press a single key from the screen menu indicating which one I want, and I'm in business!



LARKEN Electronics  
RR#2 NAVAN, Ontario  
Canada K4B 1H9

Data from Larry Kenny  
\$95(US) plus \$6 shipping for IS2068 Disc Controller  
Need to get disc drives, power supply,  
same price-will support a ZX81/10000  
drives one/two Shugart 455 or Compatible disk drive-same as IBM PC double sided

The Larken system uses double sided IBM PC compatible 5 1/4" disk drives (Shugart 455 or same) and has a formatted capacity of 160K. It can hold up to 55 files per disk. The directory is completely DOS maintained and uses file names (not page numbers). It doesn't use the token commands on the keyboard but used the same type of command entry as the Beta system for the Spectrum. It supports two drives.

In immediate mode to enter the DOS, you type a USEF command then you are in the DOS monitor and can execute commands.

In program mode the command is held in a REM statement preceded by a USEF Call, eg;

```
500 Rand USEF 6348B  
510 REM LOAD "Program.R1"
```

The DOS uses 4K of ROM, but a disk with 4 RAM DOS's that can be loaded in different areas of memory, is supplied, even in the display file so any program can be put on disk.

The board doesn't have printer ports, but does have a thru connector. A feature of the system is that it can be changed to work on a ZX81 and the disks can be read from one machine to another. But this modification takes about an hour, and the DKROM and the cable have to be replaced.

A NMI dump button is in the works for the 2068 so games can be dumped to disk from memory.

Re: the Larken system -

"One irritating thing about the LARKEN drive is the need for some 26 keystrokes to get the drive operational..." the author George Chambers, goes on in his article describing a method to help over come this short coming, in the Jan/Feb issue of Sinc-Link. On page 4-5 of this same issue is a description of the Aerco FD-ZX Floppy disc system for the 81/1000 machines. On page 12, Greg Lloyd, Compuserve ID: 76317, 1461, goes into so detail in what to look for in buying a drive system... buy a fairly well known brand, both for competitive pricing and the availability of repairs. Other considerations;... How much memory does it use? Will your printer and modem work with it? (your printer maybe a parallel type and the disc system sports one or more serial IF's-not the end of the world, just another few bucks to fix it) Can you run those 9999 Spectrum games on the system? PRICE?? The bottom line is you don't always get your money's worth. I have to admit I am biased, I own a Larken disk system for my 2068 which is the winner in the low price range.... I can compare it and other systems to the IBM PC I use at the office. The IBM, incidentally is no speed ball in any category except reducing one's bank balance!"

In the Sinc-Link Mar-Apr 1986 issue, George Chambers, the Toronto UG President took a poll and found seven LARKEN Disc users in their group and is looking into starting a SIG for the LARKEN system. Peter McMullin talks on the LARKEN system which can be used on the 81/1000 on page 4, the CODE files can be swapped from a 2068 to a ZX81 and vice versa.

Zebra Systems, Inc.  
78-06 Jamaica Ave.  
Hoodhaven, NY 11421

Data from winter 1985 price sheet

IS2068 DISK SYSTEM

Price-\$349.95 for one disk drive w/software package-add on drives-\$125 each.  
Spectrum Compatibility-modification upcoming

CP/M Compatibility-supports 64 column, available price in early 1986.

Review in LIST by N. A. Pashtoon, covered the pre production model from Portugal. Indicates the need for a INJSTOP board between the Zebra system and the IS2068. The system supports four 3" drives, double sided, with 160K per side. NOTE: Less 20K per side for menu program. System has its own RAM and two RS232 ports. Uses the token commands on the 2068. The power supply will only support two drives. Mr. Pashtoon highly recommended this system.

Review in SUM, May 1985, noted the lack of access to rear edge connector once the IF is plugged in. For those with a parallel printer a Y connector, a serial to parallel or a serial printer or a printer IF which plugs into the cartridge port...disc drive is single sided, but you just flip over disc. Lasword loaded in about 7 seconds! Richard Gravy gave it very high marks!!

A review in Sinc-Link, Mar/Apr 86, by Dan Lindhorst, on the Zebra (EMC) Disk Driver gives some details on the Portugal Timex system. "With the system you get a disk full of programs and utilities. The controller has two RS232 Serial Interfaces and the disk included with the drive has the printer LLIST and LPRINT utilities along with disk backup and some others...How hard is it to use? Just as easy as a tape recorder..."The system was purchased from EMC, Newport Rhode Island and it, the system didn't work, Bob Dyl said too bad, call Zebra. Zebra fixed it even though it wasn't one they sold Dyl....from now on I will do all my business thru Zebra.

Ed, Note: Even though the Timex system has been sold via Dyl of EMC, I am not recommending Mr. Dyl to any reader, as the number of complaints regarding EMC grows each month. We currently have four members who cannot get their orders or their money back.

#### GLOSSARY OF TERMS:

NMI-Non maskable interrupt. The 2068 generates a maskable interrupt every 1/60th of a second, a keyboard scan, and a 3 byte system variable FPAMES to be incremented by 1. The NMI is activated by pulling one of the two pins on the 2068 bus to ground. When this happens the present value of the program counter goes on the stack and the machine starts executing at some new location, where the "interrupt handler" software is. Thank to Wes, and Computus Interruptus Part I, SINCUS NEWS, January 1985

C/PM-Control Program for Microcomputers. One of the earliest and still in use disc control programs written for Z80 computers.

LR08-Language ROM-Oriented Software. A LR08 contains Z80 machine code in memory chunk 0 and is in total control of the 2068 hardware including the RESTAFL implementation and Interrupt mode setting and handling. The AROS (Application ROM-Oriented Software is dependent on the system ROM or a LR08 for these functions if needed. Glad you asked?

#### Thanks to:

Jack Dohany, Robert Glider, Larry Kenny, John Oliker, and Jerry Chamkis for taking the time and effort to contribute data and opinions for this article. Thanks to the authors of all the fine newsletters I referred to in this.

**User Comments:**

Bob Gilder on Olliger: "This is the fastest disk system I have ever seen or operated. The screen comes up within one second and the program is loaded really to run within 3-4 secs. Olliger provides fast service, the NMI save is GREAT!!"

Bob Gilder on Aerco: "Aerco provided fast service for EPRM programming of the DOS if you require a change in drives, ex- double density drives to 4.2 density."

Jack Dohany on Zebra and Aerco: "I had the use of a Zebra system for 2 months. I've owned an Aerco system for a year. I'm not too familiar with the Olliger and Ramex system. Of course the Ramex system is no longer available."

I recommend the AERCO system for anyone who loves computers and likes to fiddle with them, learn about them, and save money.

I recommend the Zebra system for anyone who hates computers and uses them out of dire necessity, and likes sealed boxes and closed architecture, and doesn't want to know anything about the workings of what he or she buys, and who simply wants it to work.

I cannot recommend for or against the Olliger system until I see its operating system; a snapshot capability, while amazing, is no substitute for a proper disc operating system. The AERCO system, incidentally, will soon have a snapshot capability: you press a button and the whole of RAM goes onto disc. I don't know the status of Ray Kingsley's DOS for the Olliger system Does anybody?

**DISADVANTAGES OF THE ZEBRA SYSTEM:**

- 1) ZEBRA won't (or can't) supply much technical information. Of course you can always phone Portugal.
- 2) They won't supply the system with anything but very nonstandard 3" disc drives. 3" diskettes typically cost about \$4 apiece, when you can find them, versus about .60 for high quality 5-1/4 diskettes at discount prices.

**ADVANTAGES OF THE ZEBRA SYSTEM:**

1. Works very well and smoothly. Operating system is nearly flawless, though I HAVE found a few minor flaws in it.
2. Includes RS232 interface.

**DISADVANTAGES OF THE AERCO SYSTEM:**

1. Some folks don't like an uncased interface board
2. The operating system has flaws and omissions. It is however being continuously improved, and is extremely useful at present.
3. DOS occupies DOCK bank, preventing use of cartridge software. Should occupy EXROM bank, and maybe will in future.

**ADVANTAGES OF THE AERCO SYSTEM:**

1. Flexibility: system can be used with a wide variety of drives.
2. Technical support is excellent. The system comes with schematics; source file of operating system is available for \$20; documentation suggests method of implementing 256K of RAM on the interface, though software to use extra ram doesn't yet exist. Interface includes RGB circuit.
3. Fortcoming enhancements (listed below) will be available on disc at low prices (RPM: \$25), with no need to buy additional hardware.

NOTES on AERCO system: I have a preliminary version of AERCO's RFM (compatible with/better than CP/M) DOS. It's 'fantastic'! It can be used with the 2068 keyboard and 80-column screen, or it can be used with AERCO's excellent RS232 interface and a terminal. With a terminal, one has a really useful RFM system with a good keyboard and a good 80-column display.

Other enhancements to the AERCO system are in the works:

- 1) Ability to run SPECTRUM software without any hardware such as an emulator board or ROM SWITCH.
- 2) BASIC MERGE utility
- 3) Snapshot capability
- 4) 256K RAM operating software.
- 5) 64/80 column operating system.

Jerry Chamkis of Aerco permits AND ENCOURAGES the assistance of knowledgeable users in the process of improving the system. This, for me, is the very best thing about the AERCO system.

**SOURCES OF INFORMATION:**

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Computus Interruptus  
Part 7(1) by Wes Brzozowski, SINCLUS

It's hard to believe that this series has been going on as long as it has, but it's even harder for me to believe that it's nearly time to 'wrap it up'. This time, we're going to cover a couple of tricks we can do because the maskable interrupt is synchronized to the computer's video output. Then we'll take a look at a more complete version of the "NMI Screen Copy" routine we started last time. Note that this second item will require you to have built my "NMI Switch" and my "LROS/AROS Development Board".

Next time we'll take an in-depth look at the interrupt driven sprite routine (which will take a whole installment, all by itself). As you may remember, we put that one 'on hold' because some of you wanted to hear about the NMI stuff. The sprite installment will end the series, unless reader questions prompt a 'follow-up'.

Since we'll be looking at interrupts and video, we should first take a quick look at how a video image is formed. A monochrome television or monitor can only produce a single tiny spot on the screen, and control its brightness, but it can also aim that spot in different places on the screen. By sweeping the spot quickly from left to right, we get the impression of a horizontal line. Then, by drawing lots of horizontal lines, it builds up a picture.

The video standard used in North America is called NTSC. This stands for National Television Standards Committee, although some swear it means Never Twice the Same Color. The NTSC system uses 525 lines every 1/30 second to make a single picture or "video frame". Now, if we count up the number of lines the TS206B gives us, that is 24 character lines x 8 pixel lines per character, we only get 192 lines. Something appears terribly wrong. Where are the rest?

Actually, the single frame drawn every 1/30 second consists of two "interlaced half frames", each drawn in one sixtieth of a second. An interlaced half frame contains only every other line in the picture. The next half-frame fills in the spaces. The reason this is done has to do with the way our eyes continue to "see" something for a short time after it has gone. The interlacing works along with this property of our eyes to prevent us from noticing any flickering in the picture.

Your computer changes the video timing just a bit, so that each half-frame is drawn on top of the previous one. This essentially changes the frame rate from 525 lines every 1/30 second to 262 1/2 lines every 1/60 second. We still don't notice any flicker because the coarser frames are being displayed twice as fast.

A quick subtraction tells us there's still 70 1/2 lines not accounted for. These lines include the border above and below the character area we have control over, as well as some special lines reserved for "electronic housekeeping". Whenever your TV picture rolls, you'll notice an odd black bar between the top and bottom of the "real picture". That's where the special lines are. While this may appear to be just interesting trivia, it can be very useful to us. Here's how.

When you produce a program that "moves" an object around the screen by erasing the old picture and drawing a new one, you'll notice the object has an annoying flicker. This is because the computer sometimes sends that portion of the picture to the screen between the time you erased one object and drew the

next. As such, there are some frames when the object is not in the screen at all.

Now, if you'll run the interrupt driven sprite program we saw so long ago, you may be surprised to see absolutely no hint of flicker! Since the sprite can run concurrently with your own programs, you can run both together and see a very noticeable difference.

The reason is that the maskable interrupt which produces the sprite always occurs when the "black bar" is being drawn off-screen. Since the sprite is put into the display file right after the maskable interrupt, it's ALWAYS there by the time the computer reads it! Thus, there can be no flicker.

Some programs "buy more time" by putting static garbage at the top of the display, like scores, remaining "lives", and such. Since the moving objects then never get to that height, there's more time to play with the display before any flickering can be seen. Another clever method to gain time is to put crude animation (that can be done quickly) all around the screen, but keep the detailed animation always near the bottom, where there's plenty of time to put it there before the video hardware tries to "pick it up". Prime examples are the incredibly detailed walking men in *TIR-NA-NOG* and *DUN-DARACK*.

Interestingly enough, while many programs use the interrupt to remove flicker, they usually don't use anything as fancy as the IMZ interrupt handler we've seen before. Instead, they use the little understood but very powerful machine code instruction, HALT. When this instruction is run the microprocessor stops and waits. It'll wait forever, unless you shut it off, send a RESET signal, or an interrupt occurs. When the interrupt is received, the TS206B or Spectrum does its normal keyboard reading and then resumes at the instruction AFTER the HALT.

In our sample programs this time, we'll use this new method, even though the old IMZ handler might be better. This will allow us to see how HALT works, in a few simple cases. You may then wish to rewrite them yourself, to work for the IMZ handler, as homework.

Listing 1

```
1 REM Produces Flickering Ora          Type in Listing 1, leaving out the
ng BORDER                                REM statement, and run it with GOTO
2 10 RANDOMIZE USR 23728 : BORDER        1000. Note that typing RUN won't work.
3 20 RANDOMIZE USR 23728 : BORDER        The program is written in its odd order
4 30 GO TO 10                            for speed purposes. A GOTO statement
5 1000 POKE 23728,113                    always works fastest when going to the
6 1010 POKE 23729,201                    first line of a program, and gets slower
7 1020 GO TO 10                            the further in the line actually is.
```

Lines 1000 and 1010 produce a very short MC program consisting of just a HALT and RET. When we call this from BASIC, we will be synchronized to the video. In lines 10 and 20 then, we synchronize to the video and alternately switch from a red to a yellow border. Now, for the first time, your border is orange. Unfortunately, we get a lot of flicker. The alternate changes cause a 30 Hertz rate, which our eyes can see. While you may not have a use for flickering borders, you may wish to alternately print some red and yellow on the screen for a nice flickering flame effect. It's also possible to do slight changes, at the pixel level. *Jet Set Willy* uses this effect to produce a more subtle shimmering in one of its rooms. As you might expect, these would be most useful in machine code; we use mostly BASIC here, to make our examples easier to follow.



Listing 2

```

10 DATA 118,62,2,211,254,118,6
2,6,211,254,195,60
30 CLEAR 195,60
40 FOR J=50000 TO 50011
50 NEXT J: POKE J,J
60 RANDOMIZE USR 50000

```

We've been playing with the border rather than the screen to get you thinking about how we might use the border for some fancy tricks. Consider that if our program is synchronized to the video, we should be able to wait until the computer is in the middle of a picture before switching the border. If we wait the same amount each time, we can produce a "horizon" that extends right through the border area:

Listing 3

```

1 RANDOMIZE USR 50000
2 GO TO 1
300 DATA 42,176,92,118,62,2,211
425,43,124,191,32,251,62,6,211,
5350 POKE 23728,112: POKE 23729,
430 BORDER 6099
430 FOR J=50000 TO 50017
440 NEXT J: POKE J,J
450 PAPER 6
460 PRINT AT 16,0:
470 FOR J=15 TO 21
480 PRINT " ";
490 NEXT J
500 GO TO 1
600 REM Full screen Horizon
700 REM Start with GOTD 300

```

Listing 4

```

ADDR HEXCODE LABEL MNEMONIC
C350 2AD05C LD HL,(5CB0)
C353 76 HALT
C354 3E02 LD A,02
C356 D3FE OUT (FE),A
C358 2B DEC HL
C359 40 LD A,H
C35B 20 OR LZ,C358
C35D 20FB giving us a time delay that depends on
C35F D3FE OUT (FE),A
C361 C9 RET

```

The machine code is in Listing 4. The first instruction gets the two POKES we made in line 350 of the BASIC program. Then we HALT, to wait for the interrupt. We resume in the next 2 instructions by making a red border. The next four instructions just loop around, just giving us a time delay that depends on the size of the POKES, we did, earlier. Then we make the border yellow, and return. Not bad!

In a real program, we probably wouldn't waste so much time in a wait loop. We'd divide our code into tasks that always take the same amount of time to execute, and the parts that take variable amounts of time. The parts that are always the same should be substituted for part of the wait loop. The rest won't be done until after the border color is changed.

horizon will be in the wrong place when run with a T82068 and an American TV set, because the British TV standard has an additional 100 lines, hence a different time delay.

Before anyone gets any great ideas about a super duper flight simulator, don't forget that banking an airplane causes the horizon to tilt, while the full screen horizon must always be level. As such, the trick is suited for a horizon when we are presumed to be on land or water, and don't tilt around. As before, this demonstrator program is written partly in BASIC, to make a complex subject easier to follow. If you really want to use it, you'll want to do some work in machine code.

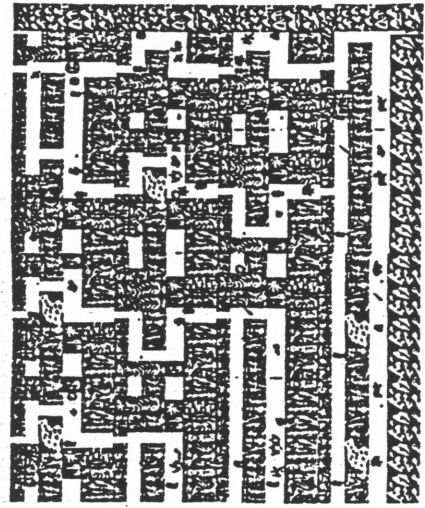
Moving into the past, let's look at the NMI screen copy routine we did last time. As I said in that installment, we broke some rules for the sake of simplicity. Because of this, the routine was likely to go bonkers after doing the copy. The basic problems were that we didn't save all the necessary registers, and the COPY routine we call disables and enables the maskable interrupt, which normally can't be done in an NMI handler. Now that you've had a little time to get comfortable with Non-Maskable Interrupts, we'll look at the horrible contortions we must endure to make it all work.

Listing 5

```

1 REM Complete NMI Screen Cop
y
10 DATA 245,229,197,33,9,60,22
237,69,33,9,60,22
5175,69,33,9,60,22
93,225,241,261,41,226,44,60,251,1
20 CLEAR 49151: OUT 244,192
30 POKE 49152+103,0
40 POKE 49152+104,60
50 FOR J=15360 TO 15387
60 FOR K=1: POKE J+49152,K
80 NEXT J
90 OUT 244,0

```



ONE SIXTEENTH of the excellent game Sabre Wolf. These 16 screens of the lower right corner of the maze were produced with the NMI Screen Copy

The Spectrum program *AQUAPLANE* uses this method to produce a full screen horizon. Although I haven't seen it, I suspect that the border a part of the

## Listing 6

```

100      ORG  #3C00
110
120 ;THE NORMAL NMI PUSHES
130      PUSH AF
140      PUSH HL
150
160 ; SAVE AN ADDITIONAL REGIST
ER
170      PUSH BC
180
190 ;GET BACK OLD INT STATUS
200
210      LD  HL,NEXT
220      PUSH HL
230      RETN
240
250 ;THE RETN CAUSES US TO CON
TINUE
HERE
260
270 NEXT  LD  A,R
280      PUSH AF
290
300      DI
310      LD  B,#C0
320      CALL #0EAF
330      DI
340
350 ;RESTORE PROPER INT STATUS
360      POP  AF
370      JP  PD,DONE
380      EI
390
400 DONE  POP  BC
410      POP  HL
420      POP  AF
430
440 ;INT STATUS HAS ALREADY BE
EN RESTORED
450 ;SO WE DON'T USE RETN
460
470      RET

```

Listing 6 is the new NMI handler, and it's incredibly whacky. Let's check it out. The PUSH AF and PUSH HL are standard for NMI, and we've added another to do the same to the BASIC registers, since the ROM COPY routine will change them. This isn't bad so far, but readers who tried to redo the routine to copy the screen without messing the interrupts will have had lots of trouble. We're going to "sneak around" the problem.

Recall that the reason we didn't want to fiddle with the maskable interrupts is that their status (which is saved when an NMI occurs) would then be corrupted, and it might not be restored properly when we execute our RETN. The trick, then, is to find out what the status was, save it where we can get at it, and then restore it OURSELVES, before we return. This requires tricks that the "learning machine code" books just don't cover. Still, once we've done them, they work fine, and we can EI and DI to our heart's content.

The trick begins with the LD HL; NEXT; PUSH HL; and RETN lines. Note that "NEXT" is the address of the instruction following this group, and so executing it simply causes us to continue on to the next instruction. However, it also restores the ORIGINAL INTERRUPT STATUS.

The instructions LD A,R and PUSH AF appear entirely useless. But if we look carefully at the flags that are affected when we use the R register, we see that the interrupt status is put into the P/V flag. Now we have the interrupt status, and we preserve it with a little "PUSH".

The next 3 instructions call the screen COPY routine in the ROM, like last time. After the CALL, we do a DI; POP AF; JP PD; DONE and EI. These restore the interrupt status. Note that we popped the flags that contained the interrupt status, and so the jump instruction has nothing to do with parity. The "parity flag" in this case is telling us whether the maskable interrupt should be enabled or disabled, and we jump accordingly.

We then restore the registers we've changed, and return to the code where it was interrupted. Note that we used a RET and not a RETN. This is because a RETN would restore a corrupted interrupt status. Since we've already restored it properly, we must instead use RET, which then leaves it alone. That's it!

Be aware that if your NMI switch is too bouncy for the capacitor to handle, it could cause two NMI pulses to occur. If this happens, the second one can corrupt the maskable interrupt status irreparably. Also note that this routine (and the ROM COPY routine) put a lot of entries on the stack. Unfortunately, a

lot of Spectrum games are first developed on TRASH-80 computers and switched over after they're debugged. (Some nonsense about productivity due to good keyboards, development tools and disk drives; it's hard to believe.) As such, the stack sometimes ends up in odd locations, and if you put too many things on the stack you may over write some machine code or variables. (Stack space doesn't come for free, gang.) This means that you may notice odd behavior in some programs after using even this corrected NMI COPY. Life is tough, but SABRE WLF has sure gotten easier!

As usual, I'm glad to get your letters and phone calls. You can write to me, Wes Brzozowski, 337 Janice St., Endicott, NY 13760. Please enclose a stamped, self addressed envelop if you wish a reply. Feel free to call at (607) 785-7007, but please call before 9:30 pm Eastern Time.

That's all until the big finale next time. See you then!

## COMPUTUS INTERRUPTUS

or, the joy of using the  
interrupts on your computer

-By Wes Brzozowski



## USER COMMENTS ON DISC DRIVES CON'T.

**LARKEN**-comments from Phil McConaghey in his review of the LARKIN IF in May 1986 LISTING... "you cannot VERIFY or MERGE programs from the disc... a hint of a CRC ERROR appears during saving, don't count on reloading that program... purchased a Japanese disc drive from Howard Electronics, 9419 Neils Thompson Dr., Austin, TX 78759 and with just adding jumpers for the spindle and stepper motor operations across B and C or only B..."

**OLIGER**-Dick Wagner's review of the Oliger IF in Time Designs, Mar/Apr 86... "a disadvantage is that only 4 files per side can be saved with 40 tracks. Double density gives a maximum of 92K bytes per side, so there can be a single file to about this length... Pro/File loads in 4 seconds and this program is near memory capacity!"

**AERCO**-In an Aerco column in the same Time Designs issue, Dennis Jurries notes "...Be extremely careful about formatting discs with a program in the computer, and also using the erase option. This can cause the disc to crash and the loss of all the information on the disc."

**ZEBRA**-In the Nov/Dec 85 issue of Time Designs, John Baddis says "...as a person who uses computers at work, I have seen a lot of disk operating systems. I have yet to see one that offers so much to the user, including the systems that are out there now for the 2068... In my mind, the Zebra Floppy disc drive system was and is the best mass storage system, bar none."

So, there is what is on the market, as of June 1986. All systems have their flaws and their good points. Of course it is up to you to decide which. Time Designs current issue is supposed to carry a comparison article on discs, so for another point of view, read them. Any comments, questions or disagreements write to me, be glad to listen, and hope to learn. -PAH editor